

Parallel Detection of Multiple Biomarkers During Spaceflight, Phase I

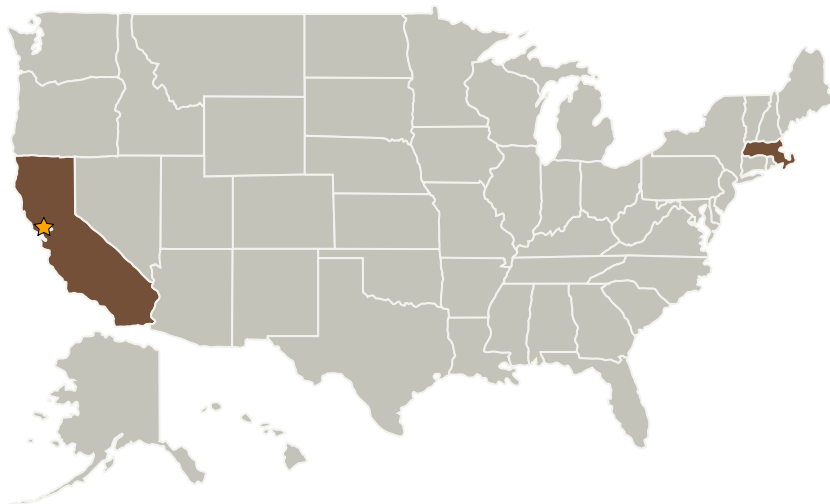
Completed Technology Project (2006 - 2006)



Project Introduction

Maintaining the health of astronauts during extended spaceflight is critical to the success of the mission. Radiation Monitoring Devices, Inc. (RMD) proposes an instrument to monitor astronauts' physiological responses to stress, microgravity, radiation, infection, and pharmaceutical agents through detection of multiple biological markers. This will be accomplished under conditions of microgravity, within the weight, size and power requirements of space missions, and with minimal human intervention. One representative biomarker of interest is 8-oxo-dG that serves as an indicator of oxidative DNA damage from radiation, chemicals, inflammation, and by-products of metabolism. Upon repair of the damaged DNA, 8-oxo-dG is excreted into the urine where it may be conveniently monitored. However, serious obstacles to detection and quantification arise due to the low amounts present and the complex chemical composition of urine. Current techniques suffer from at least one of the following shortcomings: they are slow and labor-intensive, require complex instrumentation and a highly-trained operator, cannot be easily multiplexed to monitor many analytes, consume large amounts of reagents, and are not compatible for use under microgravity. We will overcome these limitations by incorporating all analytical steps into a single microfluidic chip. Our system will utilize affinity purification and electrochemical detection.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Radiation Monitoring Devices, Inc.	Supporting Organization	Industry	Watertown, Massachusetts

Primary U.S. Work Locations

California	Massachusetts
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.5 Radiation
 - └ TX06.5.5 Monitoring Technology